

Department of Energy

§ 960.5-2-11

facilities by the occupancy and modification of flood plains, the failure of existing or planned man-made surface-water impoundments, or the failure of engineered components of the repository.

§ 960.5-2-9 Rock characteristics.

(a) *Qualifying condition.* The site shall be located such that (1) the thickness and lateral extent and the characteristics and composition of the host rock will be suitable for accommodation of the underground facility; (2) repository construction, operation, and closure will not cause undue hazard to personnel; and (3) the requirements specified in § 960.5-1(a)(3) can be met.

(b) *Favorable conditions.* (1) A host rock that is sufficiently thick and laterally extensive to allow significant flexibility in selecting the depth, configuration, and location of the underground facility.

(2) A host rock with characteristics that would require minimal or no artificial support for underground openings to ensure safe repository construction, operation, and closure.

(c) *Potentially adverse conditions.* (1) A host rock that is suitable for repository construction, operation, and closure, but is so thin or laterally restricted that little flexibility is available for selecting the depth, configuration, or location of an underground facility.

(2) In situ characteristics and conditions that could require engineering measures beyond reasonably available technology in the construction of the shafts and underground facility.

(3) Geomechanical properties that could necessitate extensive maintenance of the underground openings during repository operation and closure.

(4) Potential for such phenomena as thermally induced fracturing, the hydration and dehydration of mineral components, or other physical, chemical, or radiation-related phenomena that could lead to safety hazards or difficulty in retrieval during repository operation.

(5) Existing faults, shear zones, pressurized brine pockets, dissolution effects, or other stratigraphic or structural features that could compromise the safety of repository personnel be-

cause of water inflow or construction problems.

(d) *Disqualifying condition.* The site shall be *disqualified* if the rock characteristics are such that the activities associated with repository construction, operation, or closure are predicted to cause significant risk to the health and safety of personnel, taking into account mitigating measures that use reasonably available technology.

§ 960.5-2-10 Hydrology.

(a) *Qualifying condition.* The site shall be located such that the geohydrologic setting of the site will (1) be compatible with the activities required for repository construction, operation, and closure; (2) not compromise the intended functions of the shaft liners and seals; and (3) permit the requirements specified in § 960.5-1(a)(3) to be met.

(b) *Favorable conditions.* (1) Absence of aquifers between the host rock and the land surface.

(2) Absence of surface-water systems that could potentially cause flooding of the repository.

(3) Availability of the water required for repository construction, operation, and closure.

(c) *Potentially adverse condition.* Ground-water conditions that could require complex engineering measures that are beyond reasonably available technology for repository construction, operation, and closure.

(d) *Disqualifying condition.* A site shall be disqualified if, based on expected ground-water conditions, it is likely that engineering measures that are beyond reasonably available technology will be required for exploratory-shaft construction or for repository construction, operation, or closure.

§ 960.5-2-11 Tectonics.

(a) *Qualifying Conditions.* The site shall be located in a geologic setting in which any projected effects of expected tectonic phenomena or igneous activity on repository construction, operation, or closure will be such that the requirements specified in § 960.5-1(a)(3) can be met.

(b) *Favorable Condition.* The nature and rates of faulting, if any, within the geologic setting are such that the magnitude and intensity of the associated

seismicity are significantly less than those generally allowable for the construction and operation of nuclear facilities.

(c) *Potentially Adverse Conditions.* (1) Evidence of active faulting within the geologic setting.

(2) Historical earthquakes or past man-induced seismicity that, if either were to recur, could produce ground motion at the site in excess of reasonable design limits.

(3) Evidence, based on correlations of earthquakes with tectonic processes and features, (e.g., faults) within the geologic setting, that the magnitude of earthquakes at the site during repository construction, operation, and closure may be larger than predicted from historical seismicity.

(d) *Disqualifying Condition.* A site shall be disqualified if, based on the expected nature and rates of fault movement or other ground motion, it is likely that engineering measures that are beyond reasonably available technology will be required for exploratory-shaft construction or for repository construction, operation, or closure.

APPENDIX I TO PART 960—NRC AND EPA REQUIREMENTS FOR POSTCLOSURE REPOSITORY PERFORMANCE

Under proposed 40 CFR part 191, subpart B—*Environmental Standards for Disposal*, §191.13, “Containment Requirements”, specifies that for 10,000 years after disposal (a) releases of radioactive materials to the accessible environment that are estimated to have more than one chance in 100 of occurring over a 10,000 year period (“reasonably foreseeable releases”) shall be projected to be less than the quantities permitted by Table 2 of that regulation’s appendix; and (b) for “very unlikely releases” (i.e., those estimated to have between one chance in 100 and one chance in 10,000 of occurring over a 10,000 year period), the limits specified in Table 2 would be multiplied by 10. The basis for Table 2 is an upper limit on long term risks of 1,000 health effects over 10,000 years for a repository containing wastes generated from 100,000 metric tons of heavy metal of reactor fuel. For releases involving more than one radionuclide, the allowed release for each radionuclide is reduced to the fraction of its limit that insures that the overall limit on harm is not exceeded. Additionally, to provide confidence needed for compliance with the containment requirements specified above, §191.14, “Assurance Requirements”, specifies the disposal of radioactive waste in

accordance with seven requirements, relating to prompt disposal of waste; selection and design of disposal systems to keep releases to the accessible environment as small as reasonably achievable; engineered and natural barriers; nonreliance on active institutional controls after closure; passive controls after closure; natural resource areas; and design of disposal systems to allow future recovery of wastes.

The guidelines will be revised as necessary after the adoption of final regulations by the EPA.

The implementation of 40 CFR part 191, subpart B is required by 10 CFR 60.112. 10 CFR 60.113 establishes minimum conditions to be met for engineered components and ground-water flow; specifically: (1) Containment of radioactive waste within the waste packages will be substantially complete for a period to be determined by the NRC taking into account the factors specified in 10 CFR 60.113(b) provided that such period shall be not less than 300 years nor more than 1,000 years after permanent closure of the geologic repository; (2) the release rate of any radionuclide from the engineered barrier system following the containment period shall not exceed one part in 100,000 per year of the inventory of that radionuclide calculated to be present at 1,000 years following permanent closure, or such other fraction of the inventory as may be approved or specified by the NRC, provided that this requirement does not apply to any radionuclide which is released at a rate less than 0.1% of the calculated total release rate limit. The calculated total release rate limit shall be taken to be one part in 100,000 per year of the inventory of radioactive waste originally emplaced in the underground facility that remains after 1,000 years of radioactive decay; and (3) the geologic repository shall be located so that pre-waste-emplacment ground-water travel time along the fastest path of likely radionuclide travel from the disturbed zone to the accessible environment shall be at least 1,000 years or such other travel time as may be approved or specified by the NRC.

The guidelines will be revised as necessary to ensure consistency with 10 CFR part 60.

APPENDIX II TO PART 960—NRC AND EPA REQUIREMENTS FOR PRECLOSURE REPOSITORY PERFORMANCE

Under proposed 40 CFR part 191, subpart A—*Environmental Standards for Management and Storage*, Section 191.03, “Standards for Normal Operations”, specifies: (1) That operations should be conducted so as to reduce exposure to members of the public to the extent reasonably achievable, taking into account technical, social, and economic considerations; and (2) that, except for variances